

# Screening Analysis for Ocean SAMP

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# Context

- Focus of present effort to establish areas that are suitable for renewable energy development in RI coastal waters (**one portion** of the larger Ocean SAMP planning exercise)
- Sources of renewable energy from ocean: waves , in-stream tidal currents, mean currents, ocean thermal energy conversion, and wind). Wind only viable energy resource for grid scale power production in RI

# Overview

## Tier #1 Analysis (Hard Constraints)

Energy Resource (wind, waves, tidal/mean currents, OTEC)

Exclusions

Technology Type

Extended ( TDI, Visualization, Marine Transportation)

Tier #2 Use conflicts/collaboration and environmental impacts (NOT ADDRESSED IN THIS PRESENTATION TO BE COVERED IN FOLLOW-ON WORK)

# Tier #1 Screening (Hard Constraints)

## Wind Resource

- Adequate Wind Resources ( greater than 7 m/sec at 80 m, hub height)

## Exclusions

- Navigation Areas -Regulated ( shipping lanes, precautionary areas, preferred routes)
- Vessel tracks ( AIS data)
- Ferry Routes
- Regulated areas ( disposal site, military areas, unexploded ordnance, marine protected areas)
- Airport buffer zones
- Coastal buffer zone ( 1 km)
- Cable Areas (?)



# Tier #1 Screening (cont'd)

- Water depth

Minimum depth – 5 m ( access by barge and heavy construction equipment)

Maximum depths

*Mono-piles*

20 m typical depths in Europe

25 m DNV suggested limit ( RI WINDS study choice – 75 ft)

30 m Limit of shallow water ( deepest depth in Europe)

# Tier #1 Screening (cont'd)

- Water Depths

Maximum Depths –

*Jacket structures*

50 to 60 m DeepWater Wind

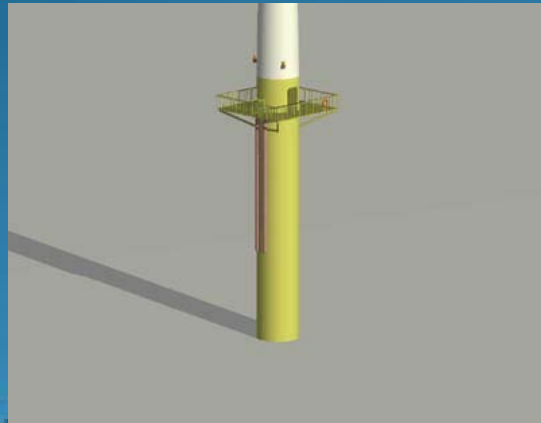
(45 m for Beatrice Demonstration Project in Scotland)

*Floating*

No depth limit

# Fixed Bottom Substructure Technology

## Proven Designs



**Monopile Foundation**

- Most Common Type
- Minimal Footprint
- Depth Limit 25-m
- Low stiffness



**Gravity Foundation**

- Larger Footprint
- Depth Limit?
- Stiffer but heavy

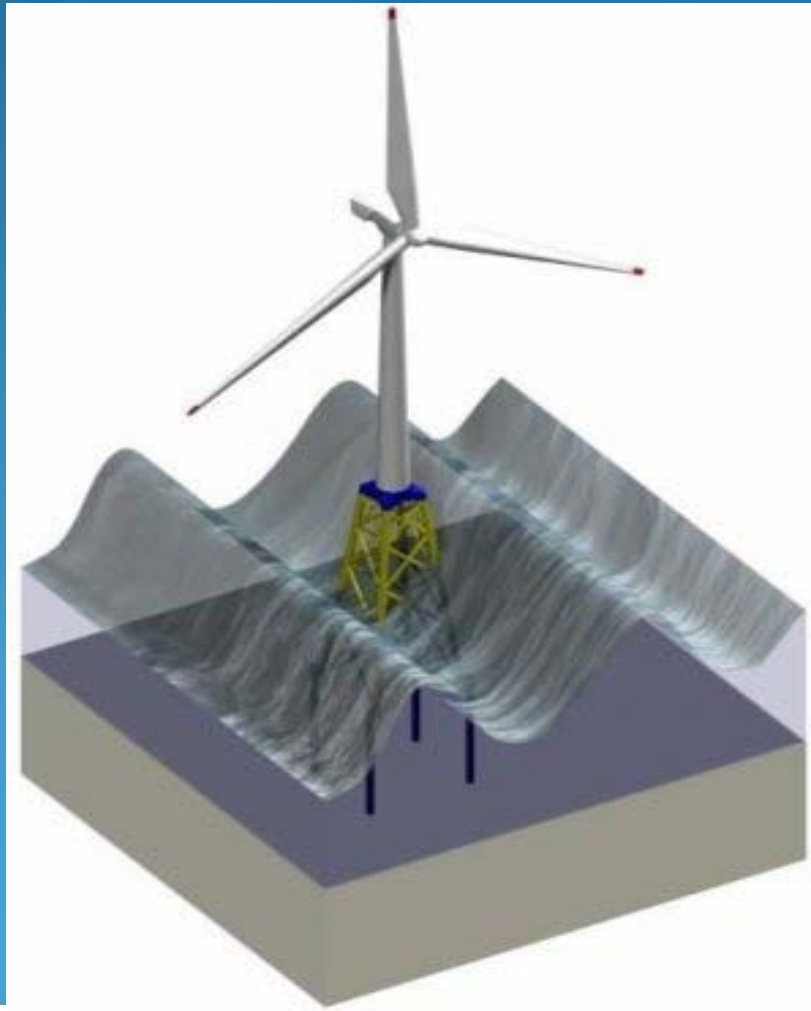
## Future



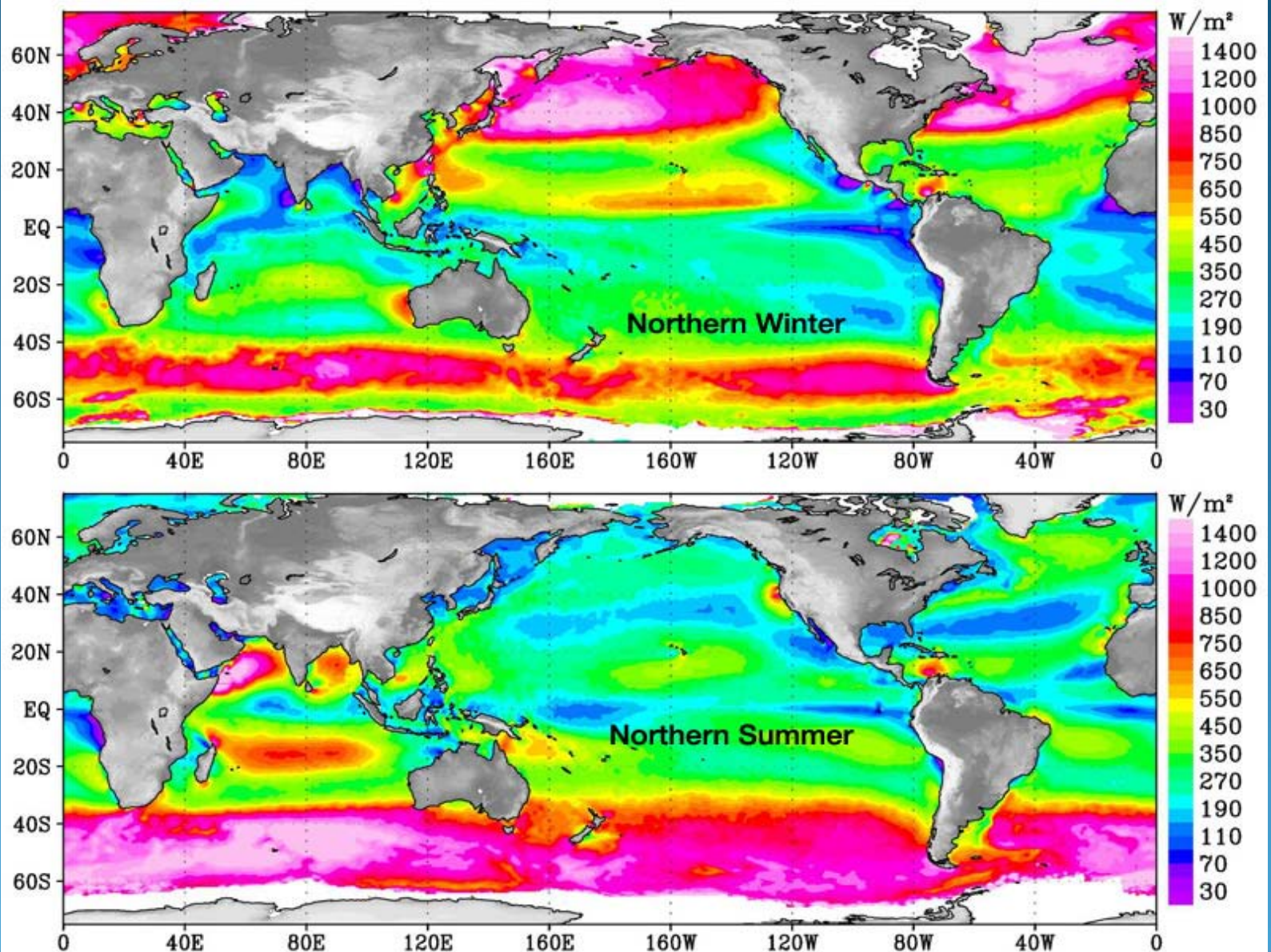
**Tripod/Truss Foundation**

- No wind experience
- Oil and gas to 450-m
- Larger footprint
- Talisman project

# DeepWater Wind Technology, OWEC ( Norwegian)

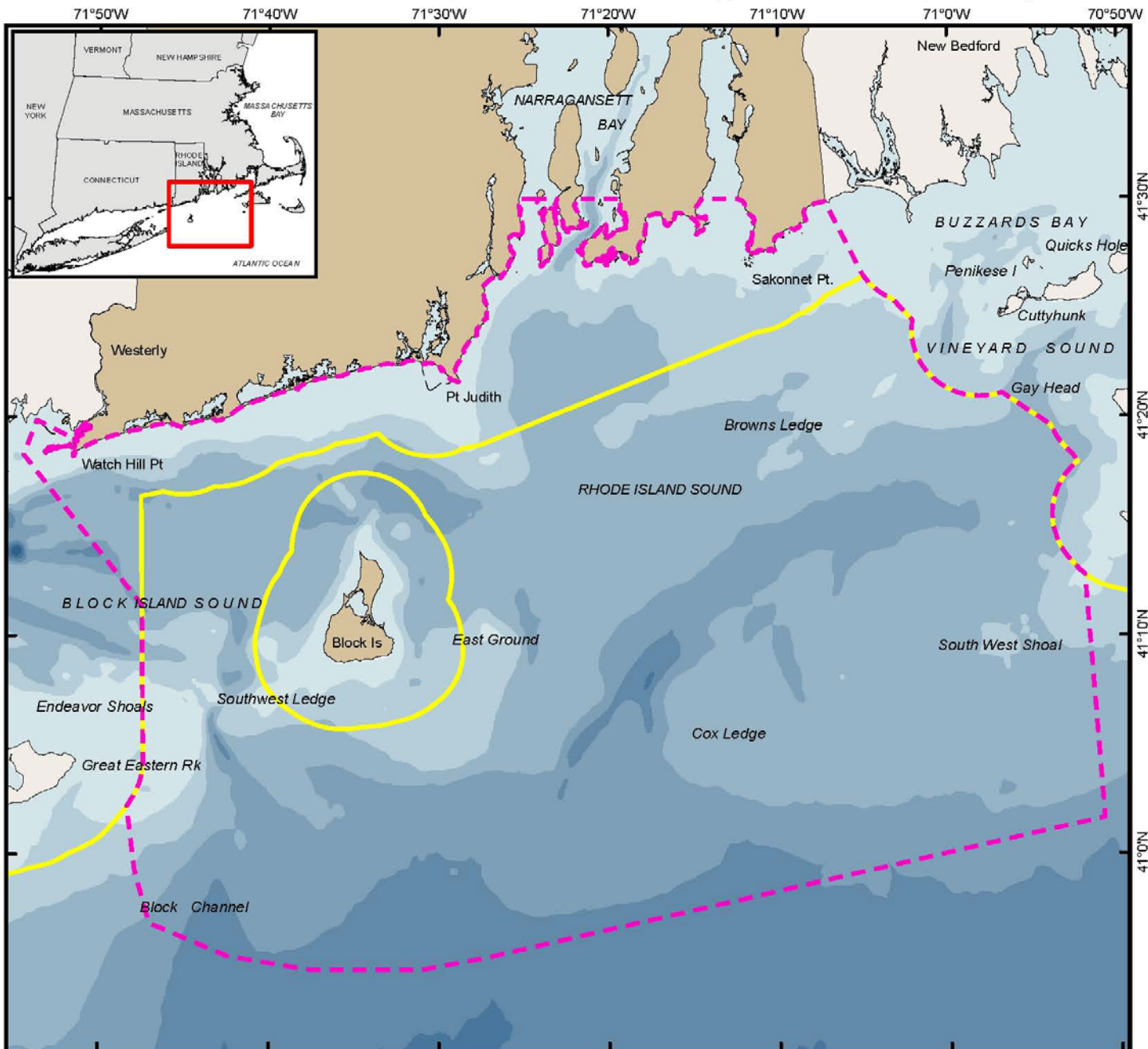
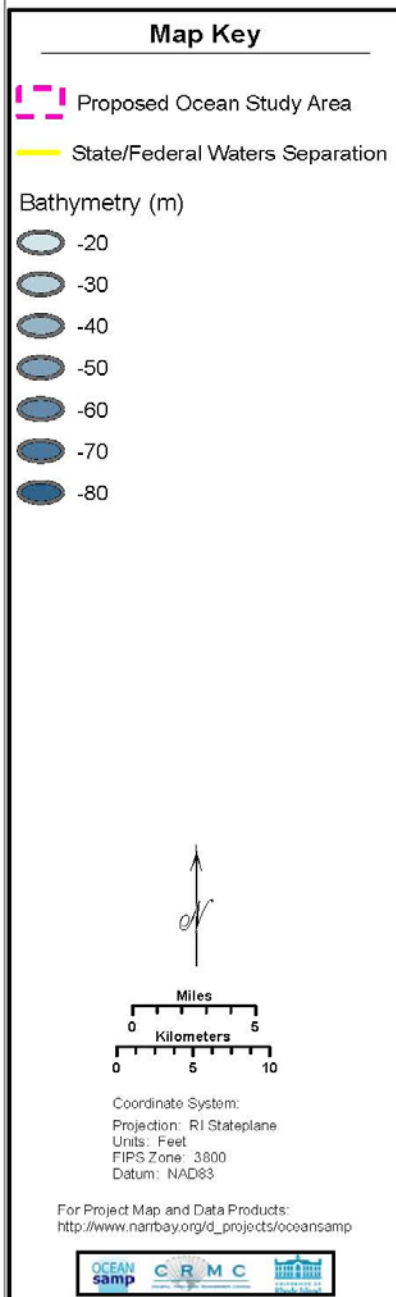


# NASA Quik Scat Winds





# Rhode Island Ocean Special Area Management Plan (SAMP)



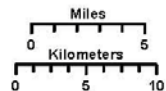
# Rhode Island Ocean Special Area Management Plan (SAMP)

## Map Key

- Proposed Ocean Study Area
- State/Federal Waters Separation
- Deep Water Wind Areas
- Grays Harbor Site
- RI WNDS Areas

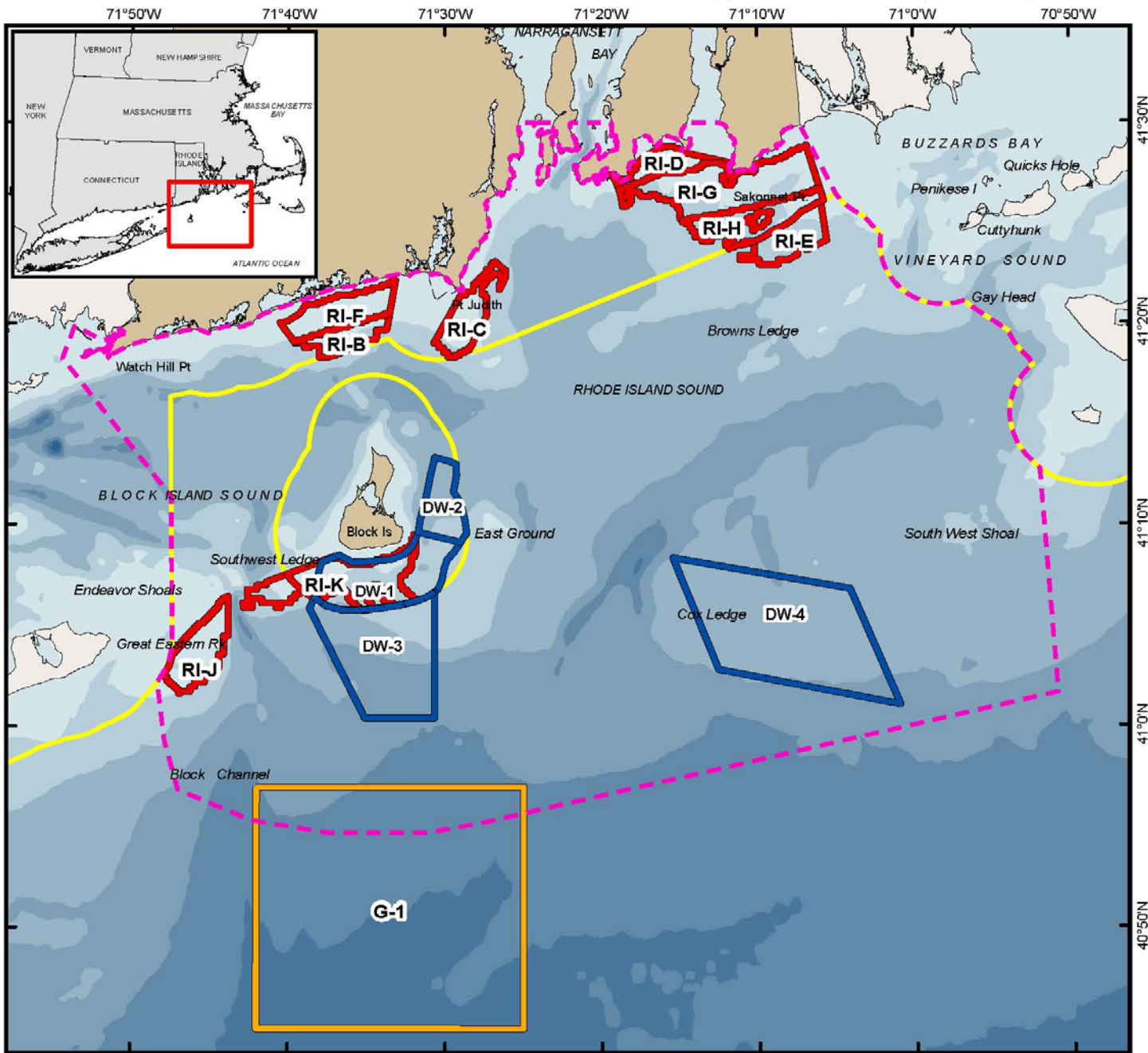
## Bathymetry (m)

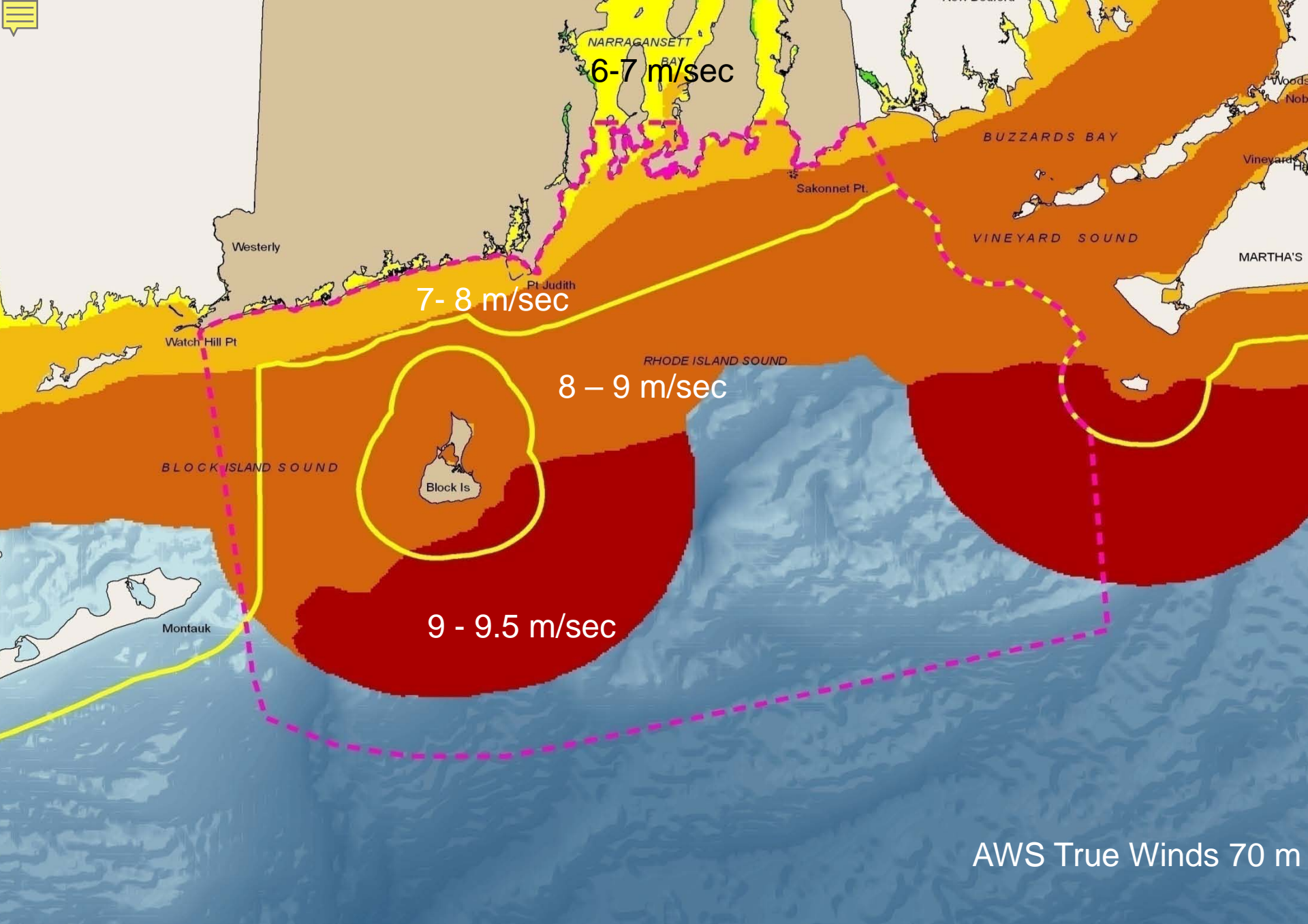
- 20
- 30
- 40
- 50
- 60
- 70
- 80



Coordinate System:  
 Projection: RI Stateplane  
 Units: Feet  
 FIPS Zone: 3800  
 Datum: NAD83

For Project Map and Data Products:  
[http://www.narrbay.org/d\\_projects/oceansamp](http://www.narrbay.org/d_projects/oceansamp)

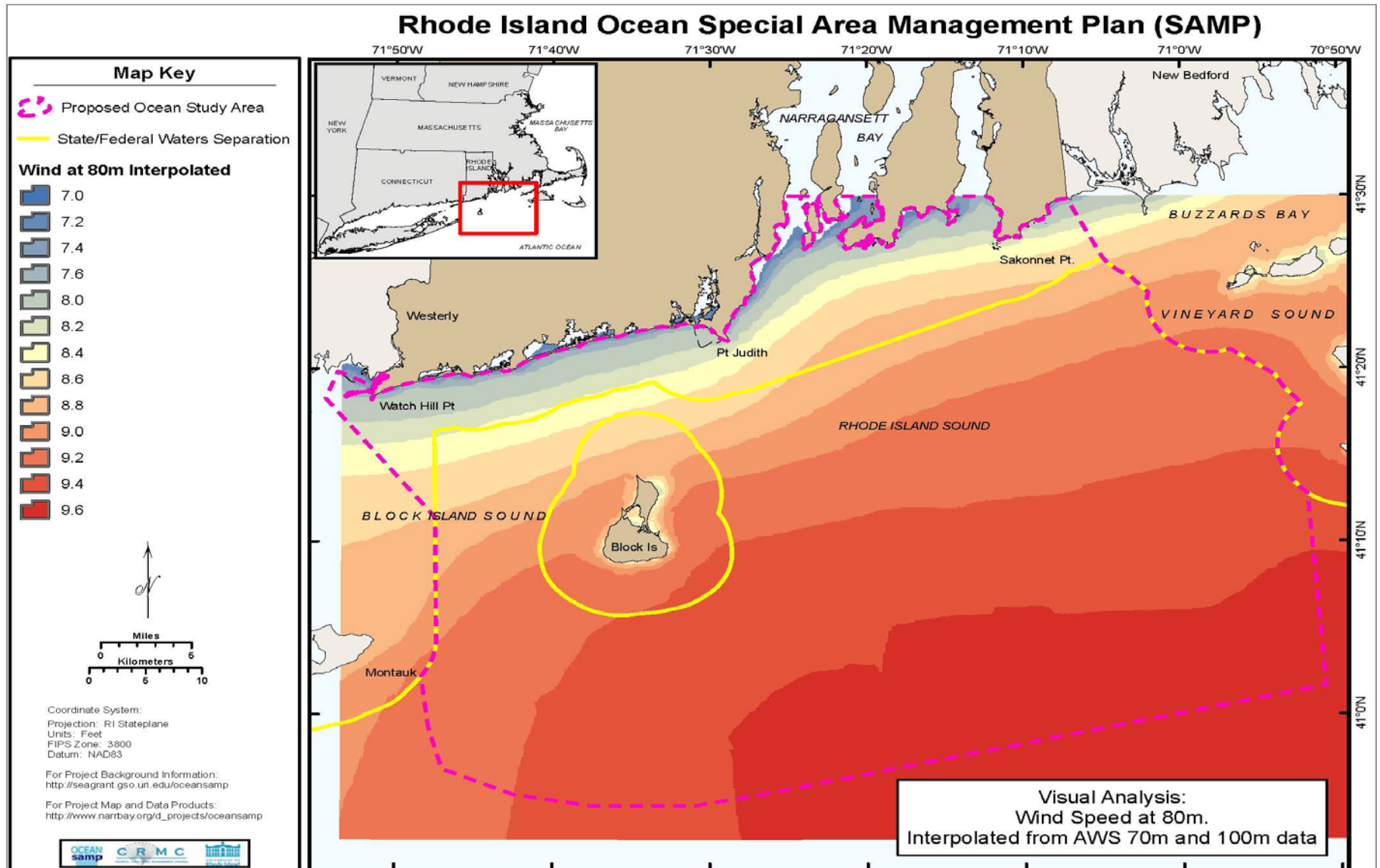




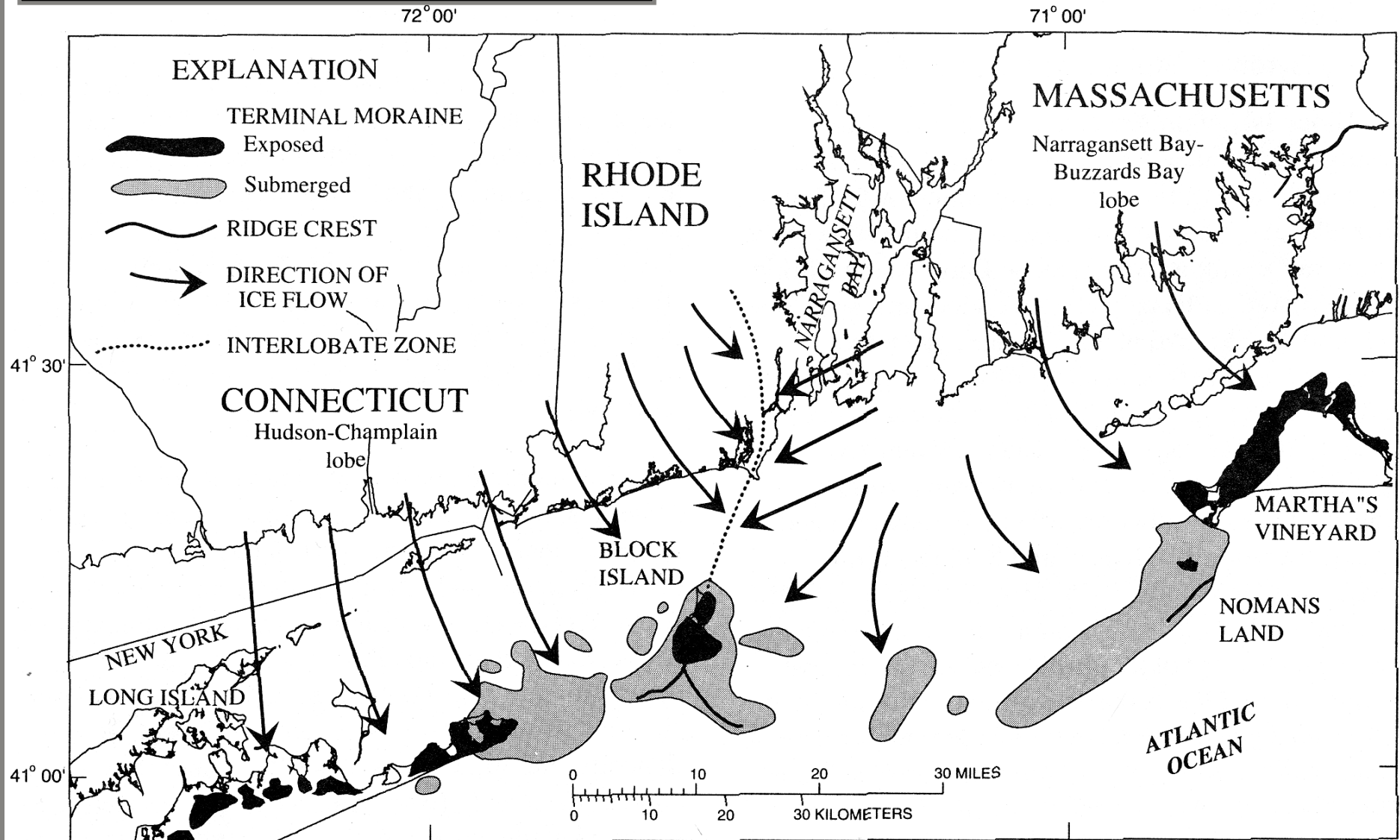
AWS True Winds 70 m



# Estimates of 80 m wind speeds AWS TrueWinds data

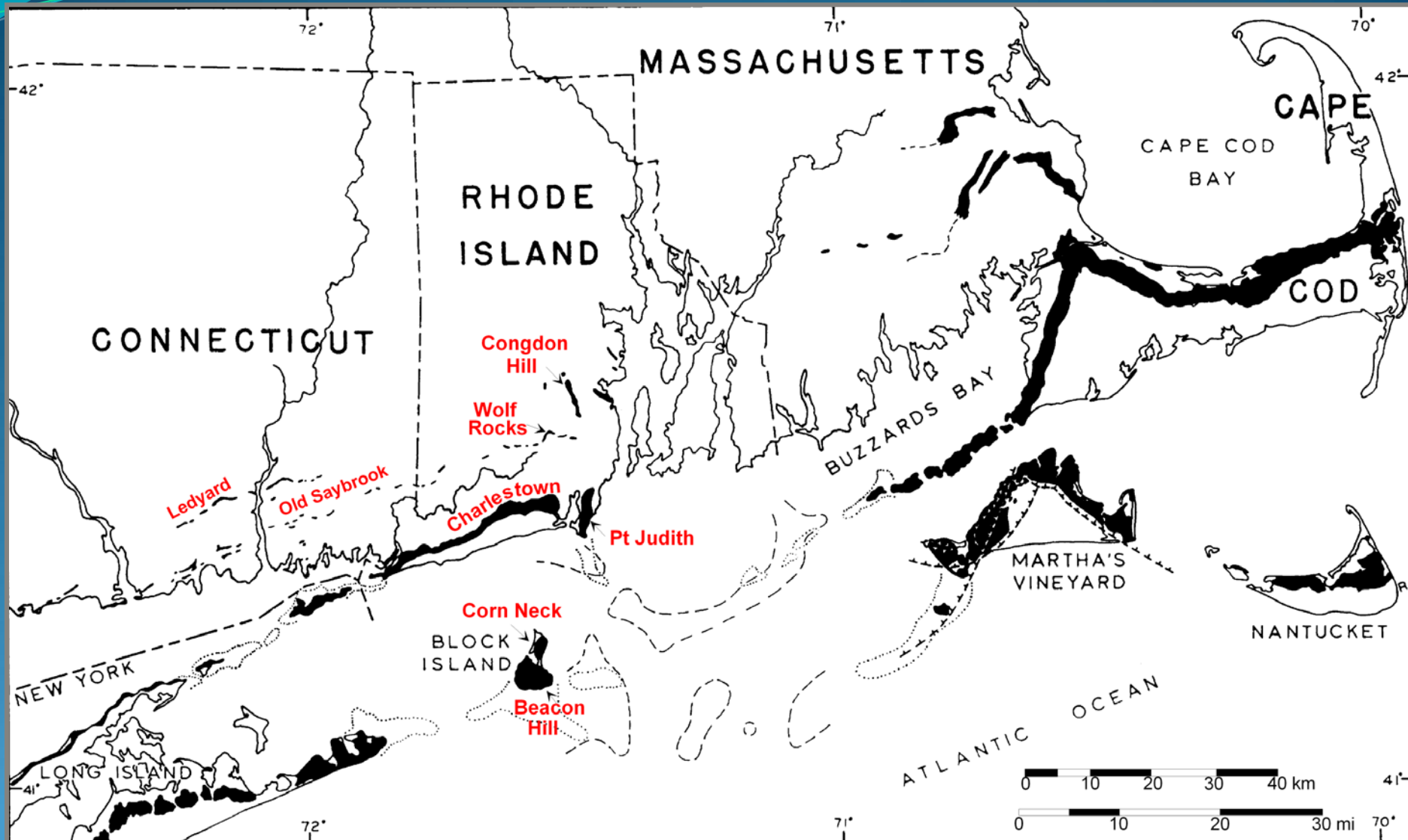


# Ice Flow Directions



Base from U.S. Geological Survey, Digital Line Graphs, 1:100,000, 1983

# End Moraines of Southeastern New England





# Rhode Island Ocean Special Area Management Plan (SAMP)

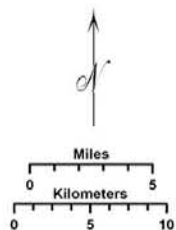
## Map Key

- Proposed Ocean Study Area
- State/Federal Waters Separation

## Glacial Geology

Stone-Borns 1986

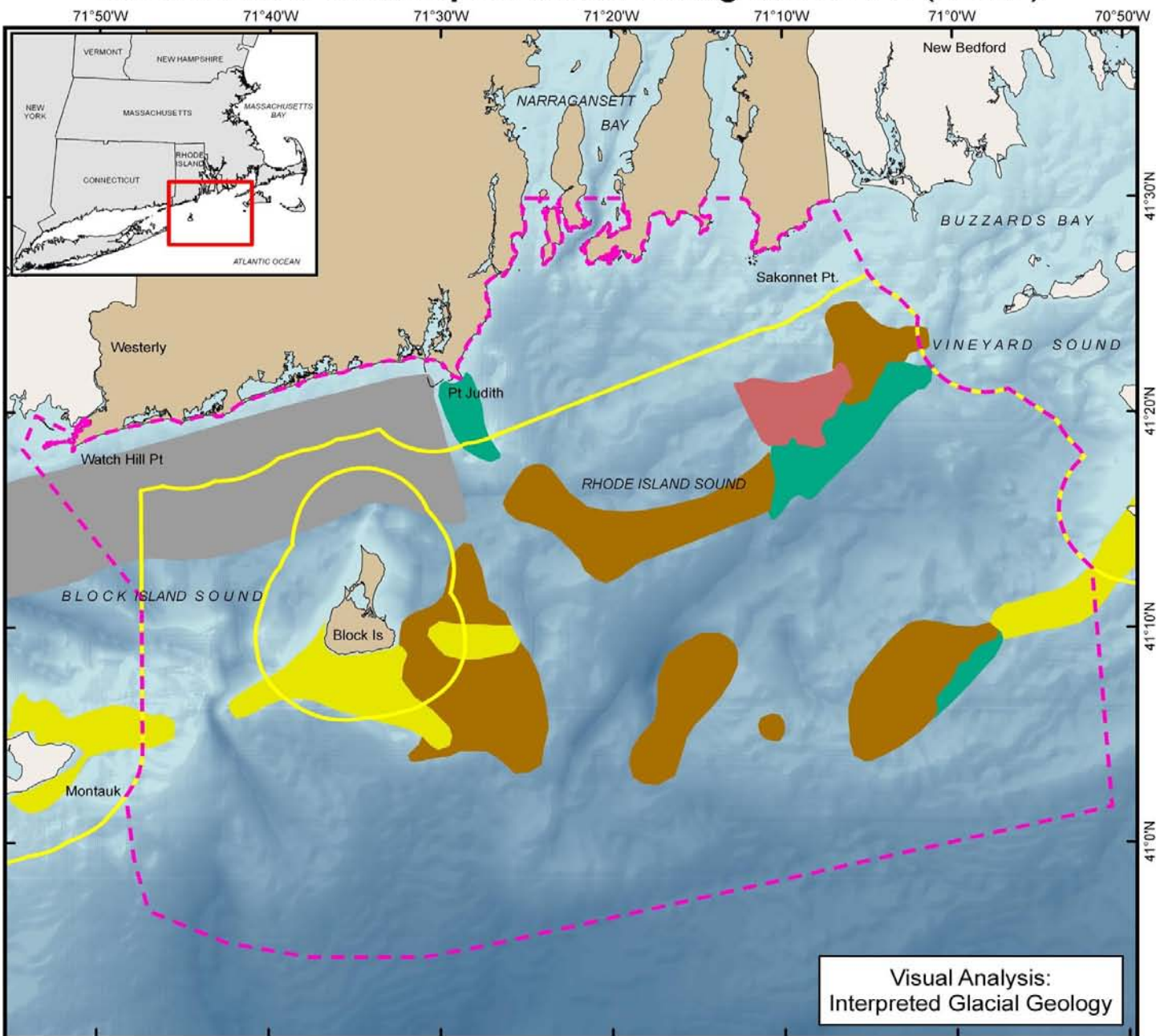
- Glacial Lakefloor
- End Moraine - Blocky
- End moraine - Boulder
- End moraine - Bold., Cob., Sand
- Tertiary Manetto Gravel



Coordinate System:  
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Visual Analysis:  
 Interpreted Glacial Geology

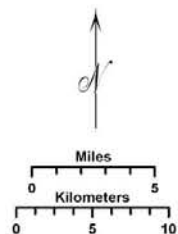
# Rhode Island Ocean Special Area Management Plan (SAMP)

## Map Key

-  Proposed Ocean Study Area
-  State/Federal Waters Separation

## Construction Effort

-  1 - 2
-  3
-  4 - 5
-  5



Coordinate System:

Projection: RI Stateplane

Units: Feet

FIPS Zone: 3800

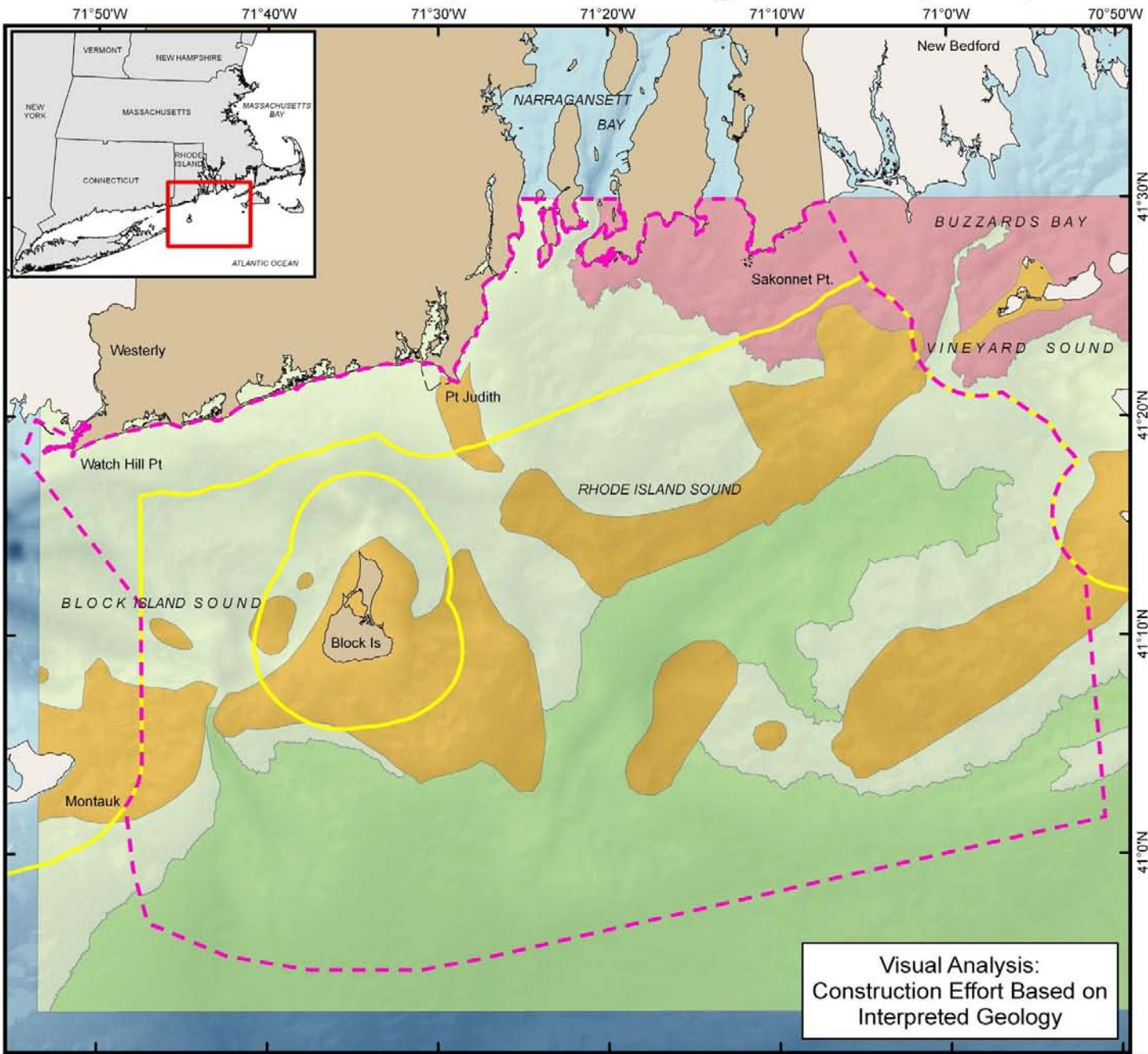
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Visual Analysis:  
Construction Effort Based on  
Interpreted Geology



# Rhode Island Ocean Special Area Management Plan (SAMP)

## Map Key

 Proposed Ocean Study Area

 State/Federal Waters Separation

 King Proposed Study Areas

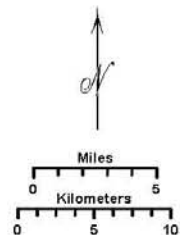
### Construction Effort

 1 - 2

 3

 4 - 5

 5



Coordinate System:

Projection: RI Stateplane

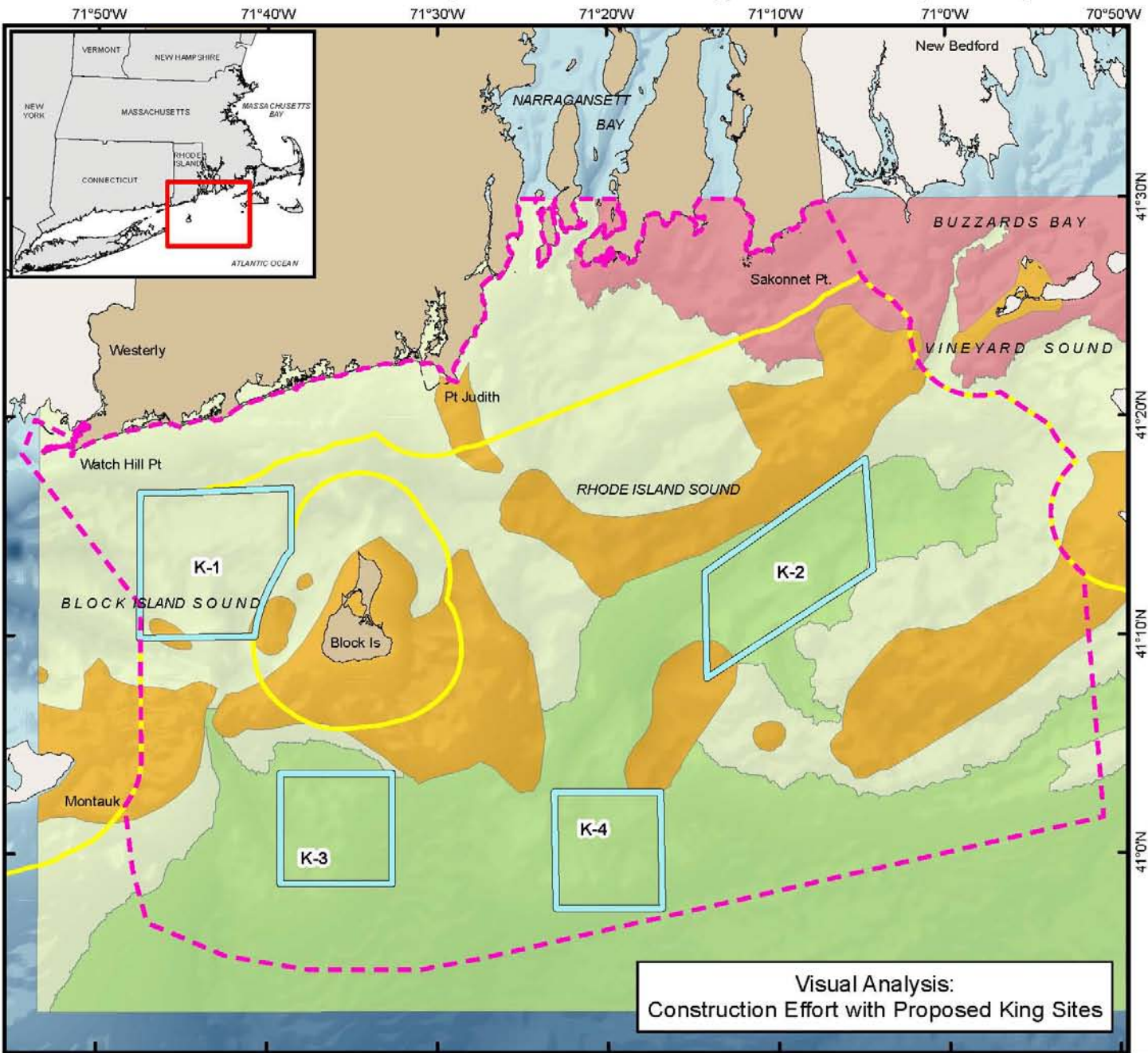
Units: Feet

FIPS Zone: 3800

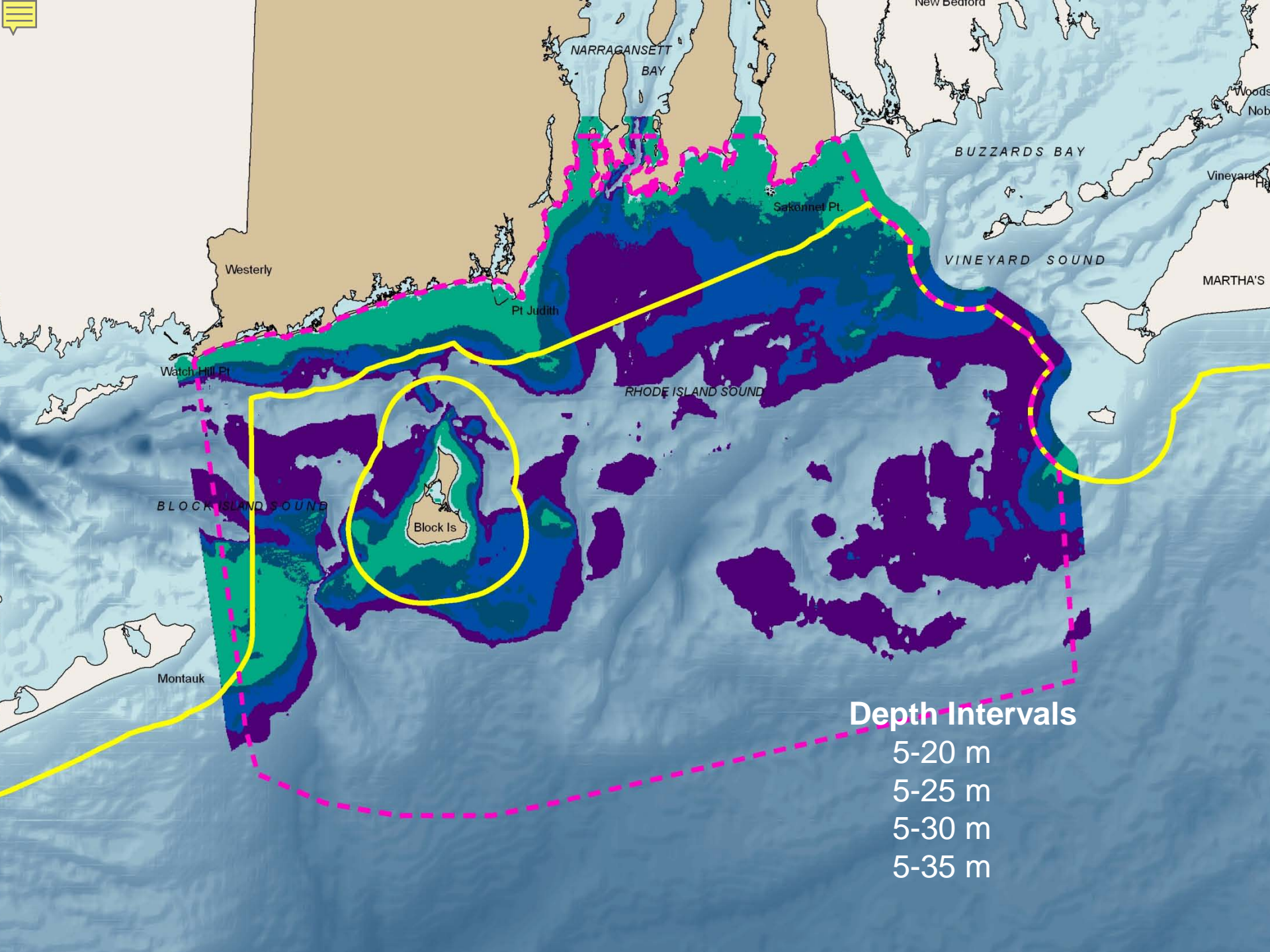
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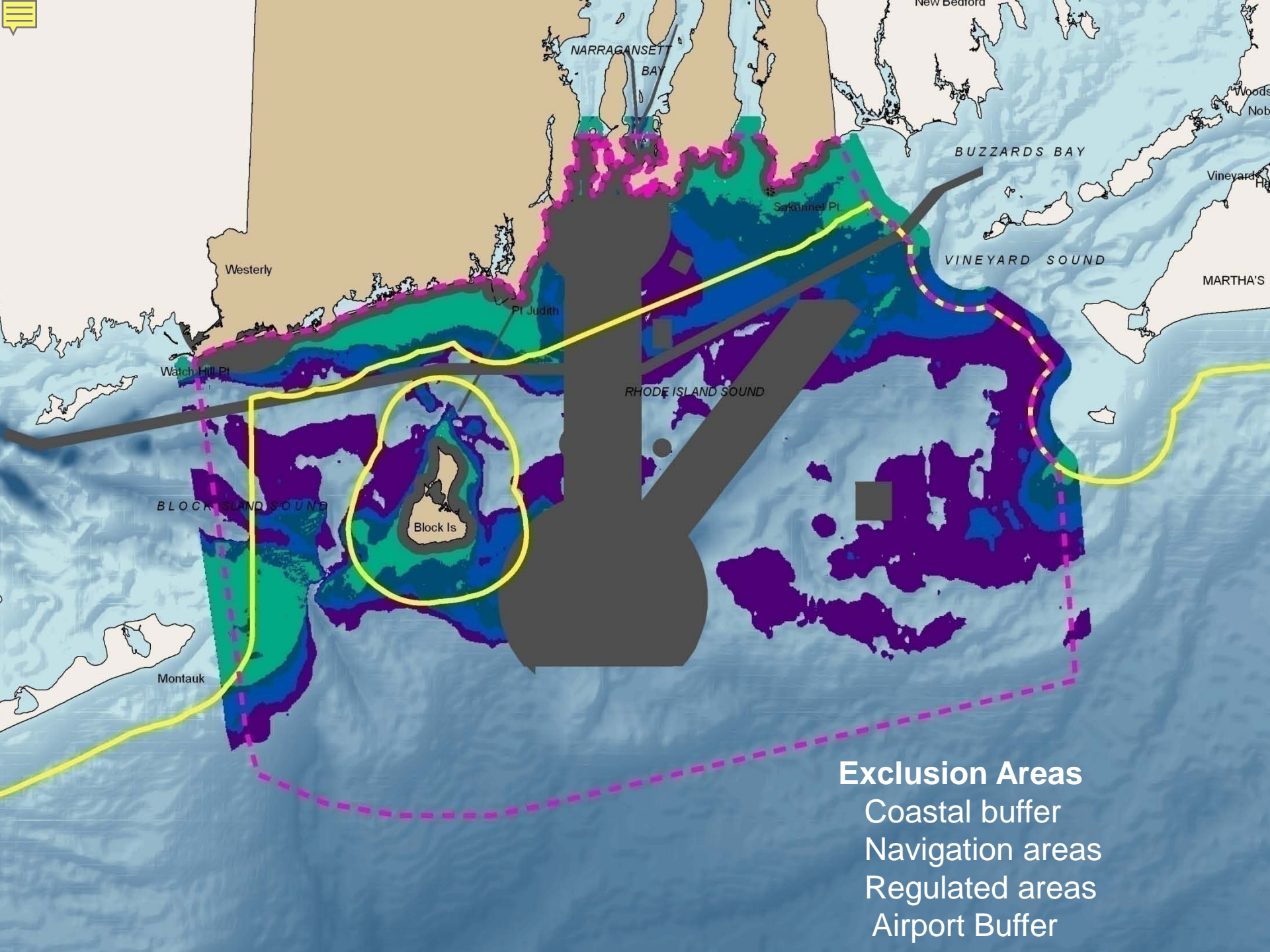
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Visual Analysis:  
Construction Effort with Proposed King Sites







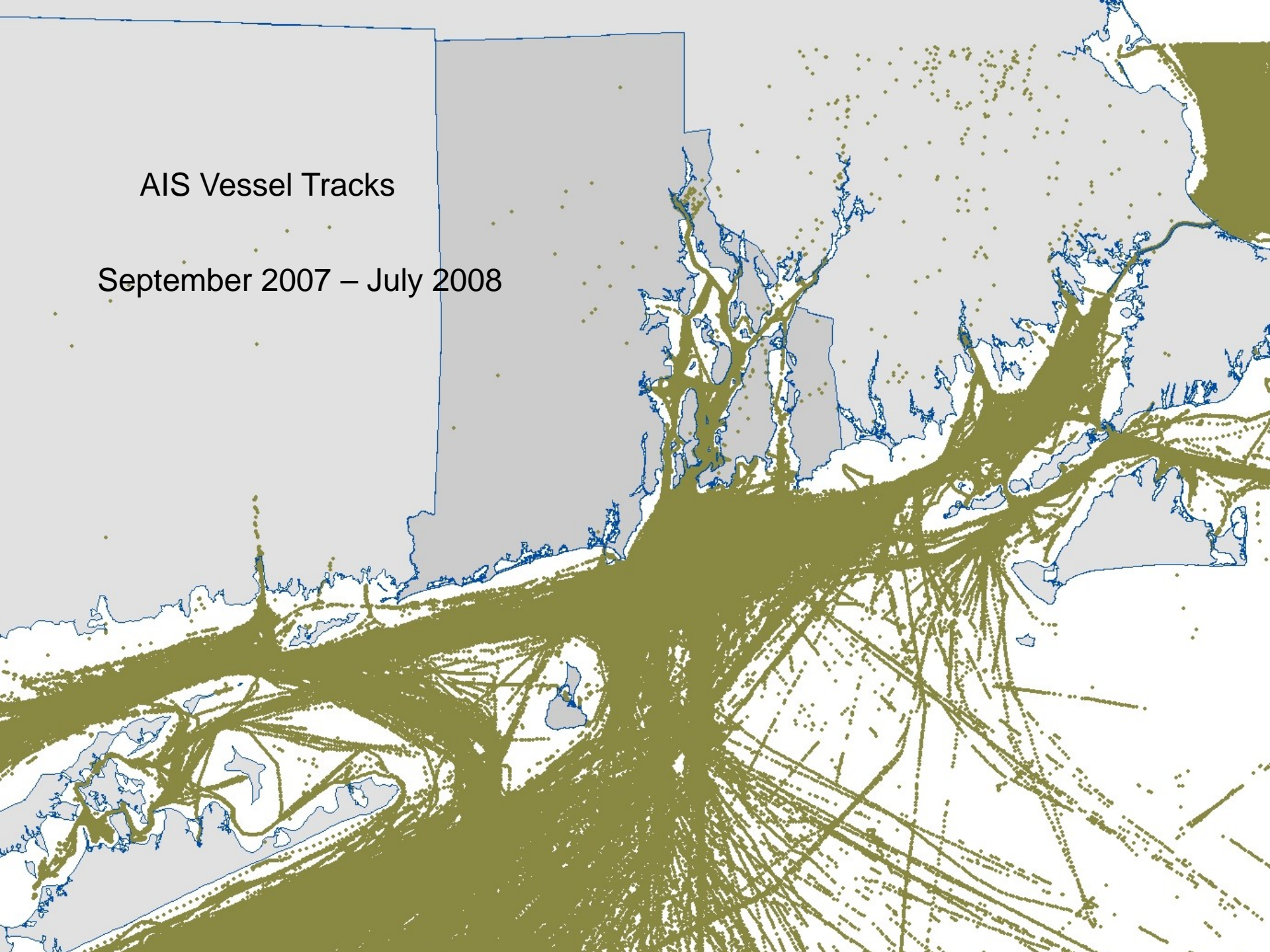
## Exclusion Areas

- Coastal buffer
- Navigation areas
- Regulated areas
- Airport Buffer



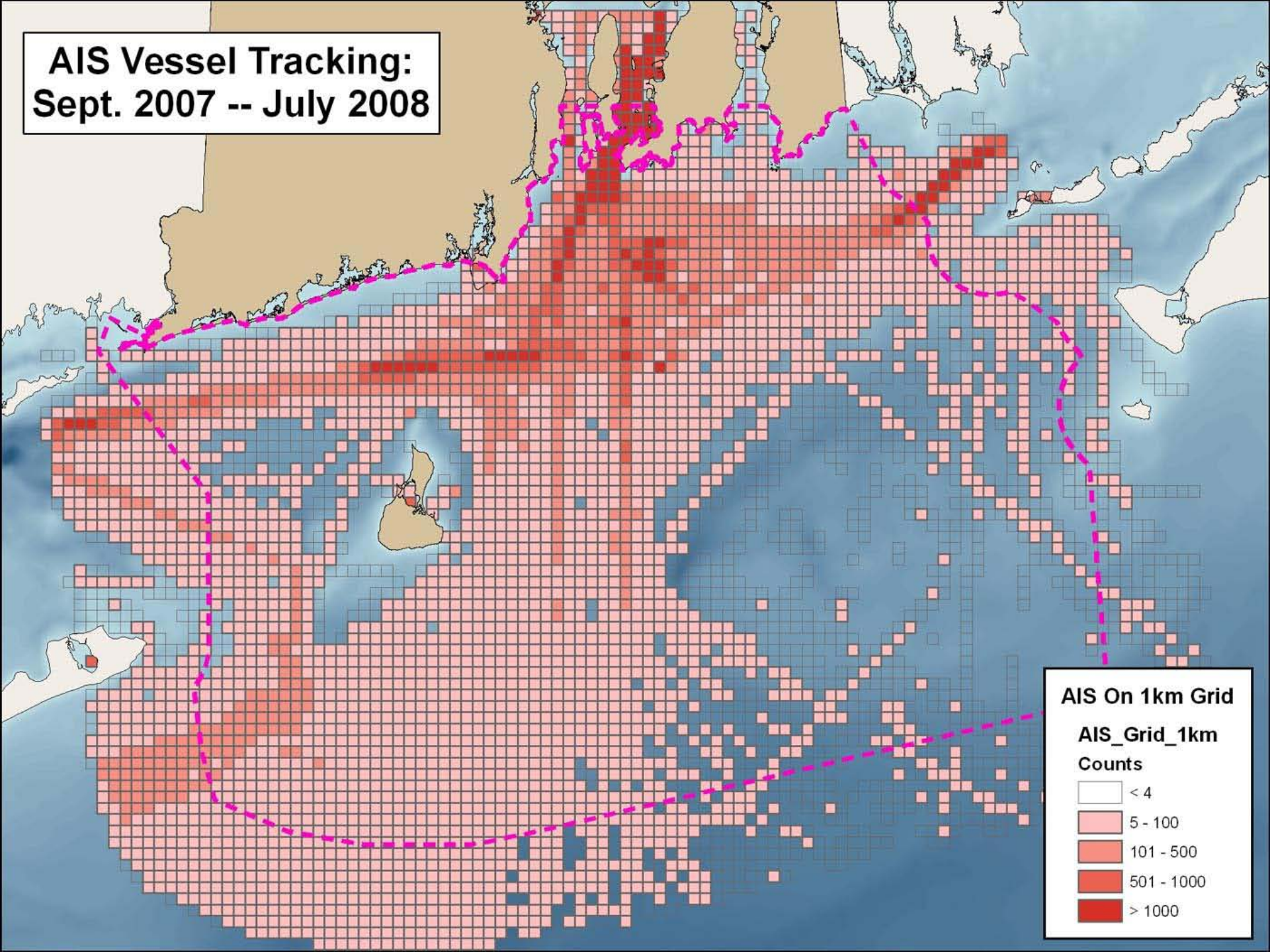
# AIS Vessel Tracks

September 2007 – July 2008



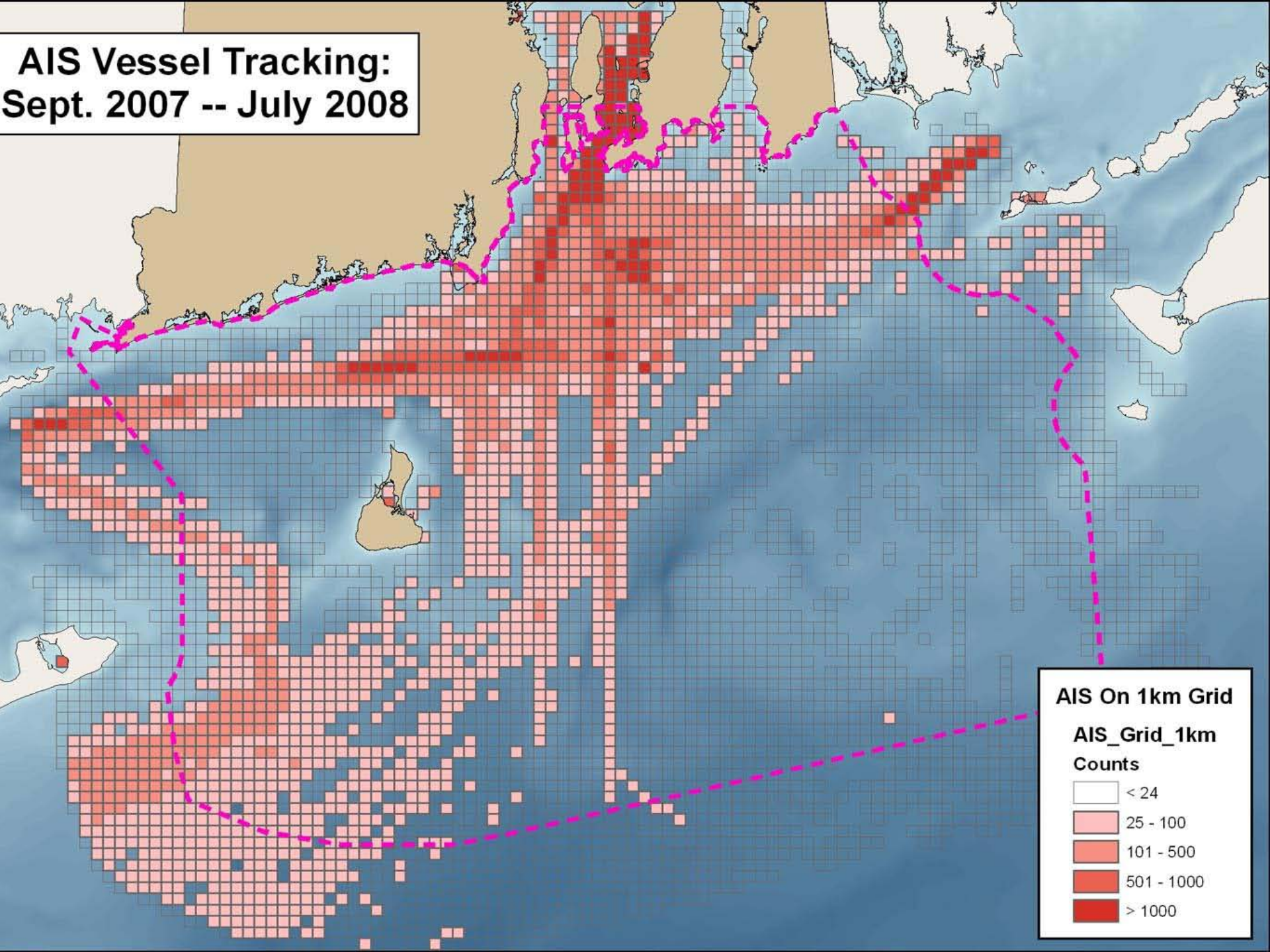


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